Protection Branch Report of Test No. 20-60

Investigation of Bacterial Contamination Inside Solar Panel

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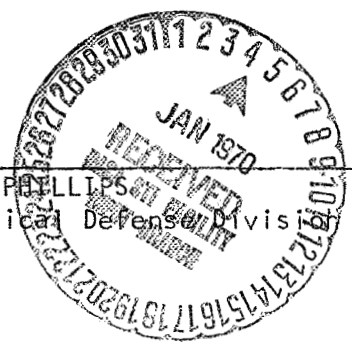

Physical Defense Division
Fort Detrick, Frederick, Maryland

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Solar panel, received in November 1959 from Jet Propulsion Laboratories, California Institute of Technology, Pasadena, California, was tested for possible internal bacterial contamination.

MATERIALS AND METHODS

The solar panel is composed of a thin top and bottom sheet of aluminum bonded to a continuous network or honeycomb of hexagonal aluminum cells. The hexagonal cell are 3-4 millimeters wide and 15 millimeters long. Each hexagonal cell has minute holes drilled through its aluminum sides to each adjoining cell to permit "breathing" so the air can escape in a vacuum thus preventing the solar panel from exploding in outer space.

The solar panel was cut into 1-3/8 inch squares and exposed to ethylene oxide for six hours in the plastic chamber described in Protection Branch Report of Test No. 7-60. After aerating the chamber for 16 hours, each square was sawed in cross section to the hexagonal cells under sterile conditions, and the pieces put into a tryptose broth blank and incubated at 37 C.

RESULTS AND DISCUSSION

From five tests in which two squares were exposed per test, only one

square showed no bacterial contamination. Since the squares were cut from a large piece of solar panel, it can be concluded that not only is there internal contamination in the solar panel but also it can not be sterilized with ethylene oxide gas in six hours. This is believed to be a simple diffusion problem. The gas would have to diffuse through the small holes, from cell to cell to reach interior cells, and six hours is apparently not enough time for this diffusion to occur. Indidentally, the same diffusion difficulty should prevent recontamination of the internal honeycomb cells once they had been sterilized. Large panels will have to be first sterilized with heat, radiation, or ethylene oxide sterilization in a vacuum chamber where penetration would occur to the inner most cells.